

1

**IONIC BLENDS AND METHODS OF PREPARATION AND APPLICATION  
THEREOF**

5

**FIELD OF THE INVENTION**

The present invention relates to mineral compositions for use in hair care products and to methods for their preparation and application.

10

**BACKGROUND OF THE INVENTION**

Damage is routinely done to the hair upon application of heat from styling implements such as hairdryers and curling irons. In addition to damage caused by the use of heat to style the hair, other hair care products, such as shampoo, conditioner and various hairsprays, gels and mousses, can be harsh on the hair and the scalp. Consequently, repeated use of these products on a daily basis can damage the hair and scalp. The brushing or combing of the hair after shampooing can also cause damage to the hair, such as split ends, leaving the hair dry and brittle, and adversely affecting the appearance of the hair. In addition, when hair sprays, gels and/or mousses are used in combination with heat from a hair dryer or curling iron, the damage to the hair can be increased.

20

25

30

35

Shampooing the hair strips the hair and scalp of its natural minerals, often leaving the hair looking dry and brittle, and making it very difficult to comb or brush. The use of conditioner after shampooing the hair is intended to repair some of the damage caused by the shampooing. However, the conditioner is sometimes difficult to rinse out of the hair, thereby leaving the hair with a greasy texture that

1

adversely affects the appearance of the hair by reducing the shiny appearance of the hair.

5           However, shampooing the hair is necessary to clean out the sebum secreted by the scalp and the dirt that accumulates in the hair. Also, conditioning is preferred in order to make the hair easier to comb or brush and facilitate easier styling  
10 of the hair. Styling of the hair often requires the use of both heat from a hair dryer or curling iron, and styling products such as hairspray, gel or mousse. This combination, however, causes damage to the hair adversely affecting its appearance. Therefore, a need arises for hair care products  
15 that are less damaging to the hair and scalp, but that retain their intrinsic qualities.

          Poly-element minerals, such as tourmaline, perlite and pitchstone, in combination with other materials, have been  
20 suggested for use in connection with the hair and scalp. In U.S. Patent No. 6,357,075 Blto Kaizuka, a hair brush is disclosed having bristles containing poly-element minerals and infrared radiation materials. The poly-element minerals are  
25 used along with the infrared radiation materials, such as alumina or titania, to coat the bristles of the hair brush. The infrared radiation materials are stated to generate extreme infrared radiation with wavelengths that are easily absorbed into the hair and scalp. The poly-element minerals  
30 are said to generate electromagnetic waves that electrically transform the nuclei of the infrared radiation materials, causing the atoms of those materials to reach excited states. This electrical transformation allegedly causes the water  
35 within the hair to be mineralized , and the protein in the scalp to be activated.

1

Also, in U.S. Patent No. 6,205,674 B1 to Kaizuka, a hair  
dryer is provided having a ceramic plate coated with a powder  
of both poly-element minerals and extreme infrared radiation  
materials. The interaction between the poly-element minerals  
and the extreme infrared radiation materials is described in  
the same manner as in U.S. Patent No. 6,357,075 B1, described  
above. When the air from the hairdryer passes over the coated  
ceramic plate, the electromagnetic waves generated from the  
poly-element minerals are allegedly blown onto the wet hair,  
thereby mineralizing the water within the hair, and activating  
the protein in the hair and scalp.

Finally, in U.S. Patent No. 5,941,253 also to Kaizuka, a  
curling iron is disclosed having a powder of both poly-element  
minerals and fluoroplastic coated on the surface. The poly-  
element minerals are said to generate negative ions radiating  
from the surface of the curling iron, thereby shortening the  
polymerization of water molecules and sufficiently  
impregnating the hair with water. The negative ions emanating  
from the surface of the curling iron allegedly activate the  
protein within the hair and scalp.

In the above cited patents, the poly-element minerals are  
always used along with either fluoroplastic or extreme  
infrared radiation materials. It is asserted to be the  
generation of electromagnetic waves or negative ions from the  
poly-element minerals that effects the mineralization of the  
water within the hair and the activation of protein within the  
hair and scalp. Moreover, in each of these patents, the poly-  
element minerals are brought in contact with the hair or scalp  
during only certain phases or aspects of hair care, i.e.,  
brushing, drying or curling. Thus, contact can only occur

1

during certain very specific activities that may or may not be used by any particular person at any particular time. The modes of contact are also somewhat tenuous such that intimate and comprehensive contact with the hair and scalp is not achieved.

In U.S. Patent No. 6,036,965 to Gubernick et al., cosmetic skin or hair cleansing compositions comprising tourmaline are described. The compositions are formulated and used for cleansing.

#### SUMMARY OF THE INVENTION

15

The present invention is directed in part to a mineral composition for use in hair care products to enhance the performance of those products and to augment the look and feel of the hair. In one embodiment, the mineral composition comprises a powder of at least one poly-element mineral selected from the group consisting of perlite, tourmaline and pitchstone. Any combination of these poly-element minerals may also be used. In another embodiment, the mineral composition comprises at least one poly-element mineral suspended in a compatible solvent. Preferred solvents for use in this embodiment are deionized water and glycol or its derivatives. In a third embodiment, the mineral composition comprises an ionic mineral extract. One method for the preparation of the ionic extract of poly-element mineral and solvent comprises suspending the poly-element mineral in a compatible solvent and heating the resulting solution under pressure for a suitable length of time. A mineral composition according to any of these embodiments may be applied to the hair by first thoroughly mixing it into a hair care product

35

1

and then applying the hair care product to the hair.

5 The use of poly-element minerals in hair care products exhibits enhancements in several areas. The minerals impart a better fragrance to the products and to the hair after use. The minerals also make the hair easier to comb after drying. The look and feel of the hair is also enhanced, including a reduction in static flyaways and increased sheen and luster. 10 In general, the overall condition of the hair is enhanced.

Certain embodiments of the poly-element mineral composition disclosed herein, when added to hair care products will decrease damage done to the hair by those products. 15 Certain embodiments of the poly-element mineral composition will also enhance the performance of hair care products, thereby improving the look and feel of the hair.

## 20 DETAILED DESCRIPTION OF THE INVENTION

In one embodiment of the present invention, a mineral composition is provided for use in hair care products. Hair care products include shampoos, conditioners, hair sprays, hair gels, permanent wave relaxers, hair structure altering 25 preparations, hair colors, hair bleaches, and any other hair care products. The composition comprises a powder of at least one poly-element mineral selected from the group consisting of tourmaline, perlite and pitchstone. The powder is preferably prepared by grinding (or milling) the at least one poly- 30 element mineral to a particle size ranging from about 0.5  $\mu\text{m}$  to about 25  $\mu\text{m}$ . Preferably, the at least one poly-element mineral is ground to a powder having a particle size ranging from about 0.5  $\mu\text{m}$  to about 10  $\mu\text{m}$ . More preferably, the at 35 least one poly-element mineral is ground to a powder having a

1

particle size ranging from about 0.5  $\mu\text{m}$  to about 5.0  $\mu\text{m}$ . Even more preferably, the at least one poly-element mineral is  
5 ground to a powder having a particle size ranging from about 0.5  $\mu\text{m}$  to about 2.5  $\mu\text{m}$ . Still more preferably, the at least one poly-element mineral is ground to a powder having a particle size ranging from about 0.5  $\mu\text{m}$  to about 1.0  $\mu\text{m}$ . The  
10 powder may consist of only one poly-element mineral, or may consist of any combination of two or three of the poly-element minerals. Preferably, a blend of at least two poly-element minerals is used. The preferred blend of minerals for addition into hair care products comprises tourmaline and  
15 perlite.

When the powder comprises a combination of poly-element minerals, each poly-element mineral may be present in any amount. However, when the powder comprises a combination of  
20 tourmaline and perlite, tourmaline is generally present in an amount ranging from about 0.5% to about 99.5% by weight, with perlite making up the remaining wt%. Preferably, tourmaline is present in an amount ranging from about 0.5% to about 50% by weight, with perlite making up the remaining wt%. More  
25 preferably, tourmaline is present in amount of about 0.5% by weight, with perlite making up the remaining 99.5% by weight.

When the powder comprises a combination of tourmaline and pitchstone, tourmaline is generally present in an amount  
30 ranging from about 0.5% to about 99.5% by weight, with pitchstone making up the remaining wt%. Preferably, tourmaline is present in an amount ranging from about 0.5% to about 50% by weight, with pitchstone making up the remaining wt%. More preferably, tourmaline is present in amount of  
35 about 0.5% by weight, with pitchstone making up the remaining

1

99.5% by weight.

5

10

When the powder comprises a combination of perlite and pitchstone, perlite is generally present in an amount ranging from about 0.5% to about 99.5% by weight, with pitchstone making up the remaining wt%. Preferably, perlite is present in an amount ranging from about 0.5% to about 50% by weight, with pitchstone making up the remaining wt%. More preferably, perlite is present in amount of about 0.5% by weight, with pitchstone making up the remaining 99.5% by weight.

15

20

25

30

When the powder comprises a combination of all three poly-element minerals, tourmaline is generally present in an amount ranging from about 0.1% to about 99.8% by weight, and perlite is generally present in an amount ranging from about 0.1% to about 99.8% by weight, with pitchstone making up the remaining wt%. In one aspect, tourmaline is present in an amount of about 99.8% by weight, perlite is present in an amount of about 0.1%, and pitchstone is present in an amount of about 0.1% by weight. In a second aspect, tourmaline is present in an amount of about 0.1% by weight, perlite is present in an amount of about 99.8% by weight, and pitchstone is present in an amount of about 0.1% by weight. In an alternative aspect, tourmaline is present in an amount of about 0.1% by weight, perlite is present in an amount of about 0.1% by weight, and pitchstone is present in an amount of about 99.8% by weight.

35

In an alternative embodiment, a suspended solution is prepared by suspending a powder of the poly-element minerals in a compatible solvent. The solution comprises a powder of poly-element minerals, prepared as described above, suspended in a compatible solvent. The solution is prepared by mixing

1

the solution until the powder of poly-element minerals is completely suspended in the compatible solvent. As above, the poly-element minerals are ground to a powder having a particle size ranging from about 0.5  $\mu\text{m}$  to about 25  $\mu\text{m}$ . Preferably, the poly-element minerals are ground to a powder having a particle size ranging from about 0.5  $\mu\text{m}$  to about 10  $\mu\text{m}$ . More preferably, the poly-element minerals are ground to a powder having a particle size ranging from about 0.5  $\mu\text{m}$  to about 5.0  $\mu\text{m}$ . Even more preferably, the poly-element minerals are ground to a powder having a particle size ranging from about 0.5  $\mu\text{m}$  to about 2.5  $\mu\text{m}$ . Still more preferably, the poly-element minerals are ground to a powder having a particle size ranging from about 0.5  $\mu\text{m}$  to about 1.0  $\mu\text{m}$ . The powder may consist of only one poly-element mineral, or may consist of any combination of two or three of the poly-element minerals. Preferably, a blend of at least two poly-element minerals is used. The preferred blend of minerals comprises tourmaline and perlite.

In a third embodiment, an ionic mineral extract is prepared by suspending a powder of the poly-element minerals in a solution and exposing the resulting solution to heat and pressure. The heated suspension of the poly-element minerals in the compatible solvent under pressure causes the extraction of mineral ions into the compatible solvent. The suspension of these ions in the compatible solvent creates an ionic mineral extract. Upon completion of the extraction process, described in more detail below, any remaining powder particles are removed from the solvent, and only the ionic mineral extract is then added to the hair care product.

35

The solution used in the extraction process comprises a



1

powder of poly-element minerals, prepared substantially as above, suspended in a compatible solvent. In this embodiment, the particle size of the powder that is suspended in the compatible solvent can be substantially greater than the particle size of the powder that is directly added into the hair care product because any remaining powder is removed from the ionic extract. The powder used for this embodiment is prepared by grinding the at least one poly-element mineral to a powder having a particle size generally ranging from about 0.05 mm to about 25 mm. Preferably, the at least one poly-element mineral is ground to a powder having a particle size ranging from 0.05 mm to about 10 mm. More preferably, the at least one poly-element mineral is ground to a powder having a particle size ranging from about 0.05 mm to about 5 mm. Even more preferably, the at least one poly-element mineral is ground to a powder having a particle size ranging from about 0.05 mm to about 0.10 mm. The powder may consist of only one poly-element mineral, or may consist of any combination of two or three of the poly-element minerals. Preferably, a blend of at least two poly-element minerals is used. The preferred blend of minerals comprises tourmaline and perlite.

A "compatible solvent" is a solvent that is relatively non-toxic and able to suspend the particles of the mineral composition. The solvent may be selected from the group consisting of deionized water, glycol and its derivatives, organic acids and bases and their derivatives, inorganic acids and bases and their derivatives, organic amines, and salt solutions. Preferably, the compatible solvent is selected from the group consisting of deionized water, glycol and glycol derivatives. In one embodiment, glycol or its

35

1

derivatives are used, wherein glycol derivatives are selected from the group consisting of propylene glycol, hexylene glycol, ethylene glycol, diethylene glycol, and glycerin. In another embodiment, deionized water is used. When preparing a suspended solution, the weight ratio of the poly-element mineral powder to the compatible solvent preferably ranges from about 1:5 to about 1:20. More preferably, the weight ratio of the poly-element mineral powder to the compatible solvent ranges from about 1:5 to about 1:10. When preparing an ionic mineral extract, the weight ratio of the poly-element mineral powder to the compatible solvent preferably ranges from about 0.05:1 to about 2.5:1. More preferably, the weight ratio of the poly-element mineral powder to the compatible solvent ranges from 0.5:1 to 1:1.

One method for preparing the ionic mineral extract comprises suspending the powder in the solvent, as above, and heating the suspended solution under pressure for a suitable period of time. A "suitable period of time" is any length of time sufficient to cause the extraction of mineral ions from the poly-element mineral powder into the compatible solvent. Time periods in the range of 12 to 120 hours are usually sufficient. When the ionic mineral extract is added to a hair care product, the ions in the ionic mineral extract react with the ingredients of the hair care product, thereby enhancing the performance of those products upon application to the hair.

In a particularly preferred embodiment, the poly-element mineral powder is suspended in a solution of deionized water and heated under pressure for a suitable length of time to cause the extraction of mineral ions into the deionized water.

1

In this embodiment, the suspended solution is preferably heated at a temperature ranging from about 5°C to about 100°C. More preferably, the suspended solution is heated at a temperature ranging from about 30°C to about 80°C. Even more preferably, the suspended solution is heated at a temperature ranging from about 50°C to about 60°C. Preferably, the suspended solution is heated under a pressure ranging from about 1 atm to about 5 atm. More preferably, the suspended solution is heated under a pressure ranging from about 1 atm to about 2 atm. Even more preferably, the suspended solution is heated under a pressure ranging from about 1 atm to about 1.25 atm. Preferably, the suspended solution is heated under pressure for a period of time ranging from about 12 hours to about 120 hours. More preferably, the suspended solution is heated under pressure for a period of time ranging from about 24 to about 48 hours.

An alternative method for preparing the ionic mineral extract comprises suspending the poly-element mineral powder in a solution of glycol or one of its derivatives and heated under pressure for a suitable length of time to cause the extraction of mineral ions into the glycol. In this embodiment, the suspended solution may be heated at a temperature ranging from about 75°C to about 200°C. Preferably, the suspended solution is heated at a temperature ranging from about 150°C to about 200°C. Alternatively, the suspended solution is heated at a temperature ranging from about 100°C to about 150°C. In another alternative, the suspended solution is heated at a temperature ranging from about 75°C to about 100°C. Preferably, the suspended solution is heated under a pressure ranging from about 1 atm to about 5

1

atm. More preferably, the suspended solution is heated under a pressure ranging from about 1 atm to about 2 atm. Even more preferably, the suspended solution is heated under a pressure ranging from about 1 atm to about 1.25 atm. Preferably, the suspended solution is heated under pressure for a period of time ranging from about 12 hours to about 120 hours. More preferably, the suspended solution is heated under pressure for a period of time ranging from about 24 hours to about 48 hours.

15

To apply the mineral composition to the hair, it is preferably first added to a hair care product. When the mineral composition comprises a powder of poly-element minerals, the powder is added to the hair care product in an amount ranging from about 0.01% to about 10% by weight. Preferably, the powder is added to the hair care product in an amount ranging from about 0.01% to about 5% by weight. More preferably, the powder is added to the hair care product in an amount ranging from about 0.01% to about 0.5% by weight. Even more preferably, the powder is added to the hair care product in an amount ranging from about 0.01% to about 0.10% by weight.

25

When the mineral composition comprises a suspended solution, the solution is added to the hair care product in an amount ranging from about 0.01% to about 10% by weight. Preferably, the solution is added to the hair care product in an amount ranging from about 0.01% to about 5% by weight. More preferably, the solution is added to the hair care product in an amount ranging from about 0.01% to about 0.5% by weight. Even more preferably, the powder is added to the hair care product in an amount ranging from about 0.01% to about

35

1

0.10% by weight.

5

When the mineral composition comprises an ionic mineral extract, the extract is added to the hair care product in an amount ranging from about 0.01% to about 10% by weight.

10

Preferably, the extract is added to the hair care product in an amount ranging from about 0.01% to about 5% by weight. More preferably, the extract is added to the hair care product in an amount ranging from about 0.01% to about 0.5% by weight. Even more preferably, the extract is added to the hair care product in an amount ranging from about 0.01% to about 0.10% by weight.

15

20

25

30

35

After the mineral composition is added to the hair care product, it is thoroughly mixed into the product. After mixing, the hair care product is applied to the hair according to the product's instructions. The presently preferred mineral composition is the ionic mineral extract because the extract requires only minimal mixing when added to the hair care product. The suspended solution is less preferable because it requires the removal of solvent from the hair care product in order to compensate for the addition of solvent from the solution. The removal of solvent is necessary when adding a suspended solution to the hair care product in order to maintain the original consistency of the hair care product. Also, the solution requires more mixing than the extract. The powder is also less preferable because it requires considerably more mixing than either the solution or the extract in order to uniformly distribute the powder throughout the hair care product to which it is added. In addition, the density of the poly-element minerals will eventually cause them to separate from solution. Accordingly, the poly-element

1

minerals, whether in powder form or in solution, will eventually separate from the hair care product. However, the extract does not include solid mineral particles, and is therefore preferable because it does not include solid particles that can separate from the solution.

5

10

#### Performance Test Methods

15

20

25

30

35

A mineral composition prepared by heating under pressure a suspended solution of perlite powder in deionized water was added to three commercially available shampoos, three commercially available conditioners, and three commercially available hairsprays. The products with the mineral composition added were tested alongside the same products without the mineral composition. Each product, both with and without the composition, was rated separately by eleven professional hairstylists. Each stylist tested each product by applying the product containing the mineral composition on one half of his head, and applying the product without the composition on the other half of his head. Tables 1 through 6 summarize the ratings given by the eleven hairstylists to each shampoo, both with and without the mineral composition. The hairstylists rated each shampoo according to several characteristics on a scale of 1 to 10, 10 being the best rating. The shampoos containing the mineral composition exhibited enhanced performance. These shampoos imparted an enhanced gloss, enhanced conditioning and moisturizing, reduced the amount of static flyaways, and enhanced the ease of combing and brushing.

Table 1: Shampoo A Without Mineral Composition Added

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Appearance	8	4	10	10	5	7	5	10	8	5	8	7.27
Product Fragrance	8	7	5	10	10	7	5	9	5	5	5	6.91
Pourability	6	6	10	4	9	9	4	9	10	8	9	7.64
Application Ease	7	4	10	8	9	6	10	6	6	8	9	7.55
Fragrance at Application	5	7	6	9	9	10	10	8	4	6	7	7.36
Foam Quality	10	5	10	7	8	10	4	10	5	6	8	7.55
Foam Quantity	7	7	8	4	10	7	7	6	6	10	4	6.91
Fragrance during Drying	7	5	4	1	2	6	4	5	4	1	1	3.64
Ease of Wet Combability	2	2	5	7	5	2	4	2	5	2	3	3.55
Ease of Dry Combability	5	2	7	2	5	4	2	5	6	4	7	4.45
Residual Fragrance on Hair	6	3	7	4	1	6	6	5	2	1	4	4.09
Hair Sheen and Luster	1	7	2	3	4	2	3	1	2	2	4	2.82
Static Flyaways	6	7	1	2	2	7	4	6	5	3	6	4.45
Feel and Touch of Dry Hair	6	6	6	2	3	3	3	1	5	7	4	4.18
Overall Condition of Hair	7	6	3	6	1	7	4	4	1	3	7	4.45

Table 2: Shampoo A With Mineral Composition Added

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Appearance	5	8	9	4	7	7	4	4	10	7	9	6.73
Product Fragrance	10	9	9	6	7	8	10	10	6	8	7	8.18
Pourability	4	7	4	5	9	9	5	9	9	8	10	7.18

1

5

10

15

20

Application Ease	5	6	4	4	9	4	9	9	8	4	7	6.27
Fragrance at Application	6	6	7	6	5	10	5	8	8	10	10	7.36
Foam Quality	8	5	9	10	9	9	7	4	7	4	4	6.91
Foam Quantity	5	10	5	7	4	9	4	4	10	4	5	6.09
Fragrance during Drying	6	10	7	3	7	1	1	9	6	4	7	5.55
Ease of Wet Combability	1	3	1	1	6	1	1	2	9	4	9	3.45
Ease of Dry Combability	4	8	10	6	2	9	3	7	5	7	10	6.45
Residual Fragrance on Hair	1	7	10	4	7	2	7	10	7	5	8	6.18
Hair Sheen and Luster	5	5	9	4	3	9	6	4	8	8	2	5.73
Static Flyaways	7	6	1	7	9	7	1	5	2	8	9	5.64
Feel and Touch of Dry Hair	8	3	10	1	4	7	4	10	7	10	1	5.91
Overall Condition of Hair	3	6	2	2	9	6	6	2	6	7	7	5.09

25

Table 3: Shampoo B Without Mineral Composition Added

30

35

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Appearance	6	9	5	8	5	4	4	9	10	9	10	7.18
Product Fragrance	6	7	4	8	7	10	4	5	5	9	10	6.82
Pourability	9	10	8	7	7	5	6	10	4	5	4	6.82
Application Ease	9	4	4	8	9	4	4	4	4	5	9	5.82
Fragrance at Application	10	8	8	6	6	5	10	10	9	4	7	7.55
Foam Quality	5	5	6	9	6	6	8	6	6	7	9	6.64
Foam Quantity	4	8	10	7	6	4	6	6	7	4	9	6.45
Fragrance	5	5	6	7	3	6	6	1	4	7	4	4.91



1

5

10

15

during Drying												
Ease of Wet Combability	5	5	2	1	6	1	4	6	3	4	5	3.82
Ease of Dry Combability	6	4	2	4	3	4	1	4	6	4	7	4.09
Residual Fragrance on Hair	7	2	5	4	4	1	1	7	3	4	7	4.09
Hair Sheen and Luster	2	1	2	6	4	7	3	2	2	5	1	3.18
Static Flyaways	7	4	6	6	6	7	7	2	6	6	4	5.55
Feel and Touch of Dry Hair	5	3	7	6	5	3	3	3	5	1	6	4.27
Overall Condition of Hair	4	2	5	2	6	4	7	3	7	3	4	4.27

Table 4: Shampoo B With Mineral Composition Added

20

25

30

35

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Appearance	8	10	9	5	5	7	4	10	7	4	4	6.64
Product Fragrance	10	5	10	10	7	7	8	8	4	10	4	7.55
Pourability	8	4	4	8	8	7	8	4	4	5	5	5.91
Application Ease	10	8	9	4	8	10	10	10	8	4	9	8.18
Fragrance at Application	6	9	4	8	7	4	9	7	9	5	4	6.55
Foam Quality	5	9	6	4	5	4	7	9	4	4	10	6.09
Foam Quantity	8	8	9	7	5	10	8	10	4	8	10	7.91
Fragrance during Drying	8	10	8	3	2	10	7	10	1	7	3	6.27
Ease of Wet Combability	8	1	9	4	4	10	9	3	4	10	10	6.55
Ease of Dry Combability	7	3	4	1	9	9	7	3	2	8	2	5.00
Residual Fragrance on	8	6	4	1	2	7	7	8	6	8	6	5.73

1

5

10

Hair												
Hair Sheen and Luster	2	9	3	9	6	5	6	5	6	2	8	5.55
Static Flyaways	3	8	8	9	8	7	9	3	3	4	2	5.82
Feel and Touch of Dry Hair	4	7	10	5	4	8	3	8	2	8	9	6.18
Overall Condition of Hair	1	7	2	10	4	9	4	2	9	4	10	5.64

Table 5: Shampoo C Without Mineral Composition Added

15

20

25

30

35

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Appearance	4	6	9	6	5	5	8	6	10	8	8	6.82
Product Fragrance	10	7	6	9	10	5	10	7	9	6	6	7.73
Pourability	6	7	7	4	8	8	10	6	8	5	8	7.00
Application Ease	4	10	8	4	7	5	6	6	10	7	9	6.91
Fragrance at Application	6	10	5	4	9	7	7	6	10	10	7	7.36
Foam Quality	8	7	10	8	10	6	8	7	5	6	5	7.27
Foam Quantity	9	4	8	9	5	8	9	9	5	5	9	7.27
Fragrance during Drying	1	5	5	6	1	1	3	1	6	2	7	3.45
Ease of Wet Combability	4	3	2	5	3	7	3	7	6	1	3	4.00
Ease of Dry Combability	4	5	3	6	4	2	2	7	2	5	7	4.27
Residual Fragrance on Hair	6	7	1	6	1	5	5	2	3	3	5	4.00
Hair Sheen and Luster	6	6	2	5	6	7	7	5	2	3	3	4.73
Static Flyaways	6	3	7	2	6	4	6	6	2	5	4	4.64
Feel and Touch of Dry Hair	4	3	1	4	4	6	3	7	7	7	3	4.45

Overall Condition of Hair	1	6	2	1	6	5	2	5	2	6	1	3.36
---------------------------	---	---	---	---	---	---	---	---	---	---	---	------

Table 6: Shampoo C With Mineral Composition Added

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Appearance	8	8	10	8	4	10	5	4	5	9	6	7.00
Product Fragrance	4	4	7	5	5	9	8	4	9	9	7	6.45
Pourability	6	7	9	8	10	4	5	9	9	9	4	7.27
Application Ease	7	6	6	5	7	10	6	6	8	5	9	6.82
Fragrance at Application	4	10	10	4	5	4	10	8	8	5	10	7.09
Foam Quality	9	8	8	9	4	4	9	10	5	5	8	7.18
Foam Quantity	5	5	7	10	7	8	7	8	4	9	8	7.09
Fragrance during Drying	1	4	6	4	7	10	5	3	2	8	5	5.00
Ease of Wet Combability	3	2	5	5	6	1	1	9	1	4	8	4.09
Ease of Dry Combability	2	3	1	4	2	5	1	10	10	8	9	5.00
Residual Fragrance on Hair	10	9	2	8	3	7	2	3	4	8	7	5.73
Hair Sheen and Luster	6	2	10	2	7	8	3	10	7	8	3	6.00
Static Flyaways	5	1	4	9	5	2	2	8	2	8	4	4.55
Feel and Touch of Dry Hair	8	5	10	7	9	7	3	8	6	8	1	6.55
Overall Condition of Hair	10	9	7	3	6	6	4	1	9	8	2	5.91

Tables 7 through 12 summarize the ratings given by each hairstylist to each conditioner, both with and without the

mineral composition. The hairstylists rated each conditioner according to several characteristics on a scale of 1 to 10, 10 being the best rating. The conditioners containing the mineral composition also exhibited enhanced performance. These conditioners enhanced the sheen and luster of the hair, enhanced the conditioning, moisturizing and hydrating of the hair, and reduced static flyaways.

Table 7: Conditioner A Without Mineral Composition Added

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Appearance	8	4	10	10	5	7	5	1	8	5	8	7.27
Product Fragrance	8	7	5	10	10	7	5	9	5	5	5	6.91
Pourability	6	6	10	4	9	9	4	9	10	8	9	7.64
Application Ease	7	4	10	8	9	6	10	6	6	8	9	7.55
Fragrance at Application	5	7	6	9	9	10	10	8	4	6	7	7.36
Foam Quality	10	5	10	7	8	10	4	10	5	6	8	7.55
Foam Quantity	7	7	8	4	10	7	7	6	6	10	4	6.91
Fragrance during Drying	7	5	4	1	2	6	4	5	4	1	1	3.64
Ease of Wet Combability	2	2	5	7	5	2	4	2	5	2	3	3.55
Ease of Dry Combability	5	2	7	2	5	4	2	5	6	4	7	4.45
Residual Fragrance on Hair	6	3	7	4	1	6	6	5	2	1	4	4.09
Hair Sheen and Luster	1	7	2	3	4	2	3	1	2	2	4	2.82
Static Flyaways	6	7	1	2	2	7	4	6	5	3	6	4.45
Feel and Touch of Dry Hair	6	6	6	2	3	3	3	1	5	7	4	4.18
Overall	7	6	3	6	1	7	4	4	1	3	7	4.45

Condition of Hair												
-------------------	--	--	--	--	--	--	--	--	--	--	--	--

Table 8: Conditioner A With Mineral Composition Added

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Appearance	5	8	9	4	7	7	4	4	10	7	9	6.73
Product Fragrance	10	9	9	6	7	8	10	10	6	8	7	8.18
Pourability	4	7	4	5	9	9	5	9	9	8	10	7.18
Application Ease	5	6	4	4	9	4	9	9	8	4	7	6.27
Fragrance at Application	6	6	7	6	5	10	5	8	8	10	10	7.36
Foam Quality	8	5	9	10	9	9	7	4	7	4	4	6.91
Foam Quantity	5	10	5	7	4	9	4	4	10	4	5	6.09
Fragrance during Drying	6	10	7	3	7	1	1	9	6	4	7	5.55
Ease of Wet Combability	1	3	1	1	6	1	1	2	9	4	9	3.45
Ease of Dry Combability	4	8	10	6	2	9	3	7	5	7	10	6.45
Residual Fragrance on Hair	1	7	10	4	7	2	7	10	7	5	8	6.18
Hair Sheen and Luster	5	5	9	4	3	9	6	4	8	8	2	5.73
Static Flyaways	7	6	1	7	9	7	1	5	2	8	9	5.64
Feel and Touch of Dry Hair	8	3	10	1	4	7	4	10	7	10	1	5.91
Overall Condition of Hair	3	6	2	2	9	6	6	2	6	7	7	5.09

Table 9: Conditioner B Without Mineral Composition Added

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Appearance	6	9	5	8	5	4	4	9	10	9	10	7.18

1

5

10

15

20

25

Product Fragrance	6	7	4	8	7	10	4	5	5	9	10	6.82
Pourability	9	10	8	7	7	5	6	10	4	5	4	6.82
Application Ease	9	4	4	8	9	4	4	4	4	5	9	5.82
Fragrance at Application	10	8	8	6	6	5	10	10	9	4	7	7.55
Foam Quality	5	5	6	9	6	6	8	6	6	7	9	6.64
Foam Quantity	4	8	10	7	6	4	6	6	7	4	9	6.45
Fragrance during Drying	5	5	6	7	3	6	6	1	4	7	4	4.91
Ease of Wet Combability	5	5	2	1	6	1	4	6	3	4	5	3.82
Ease of Dry Combability	6	4	2	4	3	4	1	4	6	4	7	4.09
Residual Fragrance on Hair	7	2	5	4	4	1	1	7	3	4	7	4.09
Hair Sheen and Luster	2	1	2	6	4	7	3	2	2	5	1	3.18
Static Flyaways	7	4	6	6	6	7	7	2	6	6	4	5.55
Feel and Touch of Dry Hair	5	3	7	6	5	3	3	3	5	1	6	4.27
Overall Condition of Hair	4	2	5	2	6	4	7	3	7	3	4	4.27

Table 10: Conditioner B With Mineral Composition Added

30

35

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Appearance	8	10	9	5	5	7	4	10	7	4	4	6.64
Product Fragrance	10	5	10	10	7	7	8	8	4	10	4	7.55
Pourability	8	4	4	8	8	7	8	4	4	5	5	5.91
Application Ease	10	8	9	4	8	10	10	10	8	4	9	8.18
Fragrance at Application	6	9	4	8	7	4	9	7	9	5	4	6.55
Foam Quality	5	9	6	4	5	4	7	9	4	4	10	6.09

1

5

10

15

20

Foam Quantity	8	8	9	7	5	10	8	10	4	8	10	7.91
Fragrance during Drying	8	10	8	3	2	10	7	10	1	7	3	6.27
Ease of Wet Combability	8	1	9	4	4	10	9	3	4	10	10	6.55
Ease of Dry Combability	7	3	4	1	9	9	7	3	2	8	2	5.00
Residual Fragrance on Hair	8	6	4	1	2	7	7	8	6	8	6	5.73
Hair Sheen and Luster	2	9	3	9	6	5	6	5	6	2	8	5.55
Static Flyaways	3	8	8	9	8	7	9	3	3	4	2	5.82
Feel and Touch of Dry Hair	4	7	10	5	4	8	3	8	2	8	9	6.18
Overall Condition of Hair	1	7	2	10	4	9	4	2	9	4	10	5.64

Table 11: Conditioner C Without Mineral Composition Added

25

30

35

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Appearance	4	6	9	6	5	5	8	6	10	8	8	6.82
Product Fragrance	10	7	6	9	10	5	10	7	9	6	6	7.73
Pourability	6	7	7	4	8	8	10	6	8	5	8	7.00
Application Ease	4	10	8	4	7	5	6	6	10	7	9	6.91
Fragrance at Application	6	10	5	4	9	7	7	6	10	10	7	7.36
Foam Quality	8	7	10	8	10	6	8	7	5	6	5	7.27
Foam Quantity	9	4	8	9	5	8	9	9	5	5	9	7.27
Fragrance during Drying	1	5	5	6	1	1	3	1	6	2	7	3.45
Ease of Wet Combability	4	3	2	5	3	7	3	7	6	1	3	4.00
Ease of Dry	4	5	3	6	4	2	2	7	2	5	7	4.27

1

5

10

Combability												
Residual Fragrance on Hair	6	7	1	6	1	5	5	2	3	3	5	4.00
Hair Sheen and Luster	6	6	2	5	6	7	7	5	2	3	3	4.73
Static Flyaways	6	3	7	2	6	4	6	6	2	5	4	4.64
Feel and Touch of Dry Hair	4	3	1	4	4	6	3	7	7	7	3	4.45
Overall Condition of Hair	1	6	2	1	6	5	2	5	2	6	1	3.36

15

Table 12: Conditioner C With Mineral Composition Added

20

25

30

35

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Appearance	8	8	10	8	4	10	5	4	5	9	6	7.00
Product Fragrance	4	4	7	5	5	9	8	4	9	9	7	6.45
Pourability	6	7	9	8	10	4	5	9	9	9	4	7.27
Application Ease	7	6	6	5	7	10	6	6	8	5	9	6.82
Fragrance at Application	4	10	10	4	5	4	10	8	8	5	10	7.09
Foam Quality	9	8	8	9	4	4	9	10	5	5	8	7.18
Foam Quantity	5	5	7	10	7	8	7	8	4	9	8	7.09
Fragrance during Drying	1	4	6	4	7	10	5	3	2	8	5	5.00
Ease of Wet Combability	3	2	5	5	6	1	1	9	1	4	8	4.09
Ease of Dry Combability	2	3	1	4	2	5	1	10	10	8	9	5.00
Residual Fragrance on Hair	10	9	2	8	3	7	2	3	4	8	7	5.73
Hair Sheen and Luster	6	2	10	2	7	8	3	10	7	8	3	6.00
Static Flyaways	5	1	4	9	5	2	2	8	2	8	4	4.55



1

5

Feel and Touch of Dry Hair	8	5	10	7	9	7	3	8	6	8	1	6.55
Overall Condition of Hair	10	9	7	3	6	6	4	1	9	8	2	5.91

10

15

Hair conditioners were also separately tested for moisture retention by treating three separate swatches of hair with three different conditioners, placing them in a dehydration chamber and weighing the swatches at regular time intervals. The test was also conducted on three similar swatches treated with conditioners not containing the mineral composition. Tables 13 through 18 summarize the results of these tests, showing that the conditioners containing the mineral composition exhibit substantially enhanced moisture retention.

20

Table 13. Water Retention of Conditioner D With Mineral Composition Added

25

Time Elapsed (minutes)	Swatch #1 (grams)	Swatch #2 (grams)	Swatch #3 (grams)	Average (grams)
0	2.38	2.70	2.78	2.62
15	2.33	2.66	2.69	2.56
30	2.31	2.53	2.55	2.46
45	2.26	2.41	2.46	2.38
60	2.19	2.35	2.39	2.31
75	2.15	2.26	2.32	2.24
90	2.04	2.22	2.37	2.21

30

35

The results reported in Table 13 show that after 90 minutes in the dehydration chamber Swatch No. 1 lost approximately 14.29% of its weight, Swatch No. 2 lost approximately 17.78% of its weight, and Swatch No. 3 lost

approximately 14.75% of its weight. The average weight loss after 90 minutes in the dehydration chamber was approximately 15.65%.

Table 14. Water Retention of Conditioner D Without Mineral Composition Added

Time Elapsed (minutes)	Swatch #1 (grams)	Swatch #2 (grams)	Swatch #3 (grams)	Average (grams)
0	2.63	2.49	2.89	2.67
15	2.51	2.42	2.67	2.53
30	2.41	2.36	2.58	2.45
45	2.38	2.29	2.53	2.40
60	2.25	2.13	2.41	2.26
75	2.01	2.05	2.08	2.05
90	1.89	1.87	1.93	1.90

The results reported in Table 14 show that after 90 minutes in the dehydration chamber Swatch No. 1 lost approximately 28.14% of its weight, Swatch No. 2 lost approximately 24.90% of its weight, and Swatch No. 3 lost approximately 33.22% of its weight. The average weight loss after 90 minutes in the dehydration chamber was approximately 28.96%, a substantially greater percentage than that of the conditioners containing the mineral composition.

Table 15. Water Retention of Conditioner E With Mineral Composition Added

Time Elapsed (minutes)	Swatch #1 (grams)	Swatch #2 (grams)	Swatch #3 (grams)	Average (grams)
0	2.58	2.89	3.02	2.83
15	2.56	2.84	2.81	2.74
30	2.51	2.76	2.79	2.69
45	2.46	2.71	2.73	2.63
60	2.55	2.68	2.69	2.64
75	2.35	2.56	2.65	2.52

90	2.22	2.45	2.63	2.43
----	------	------	------	------

The results reported in Table 15 show that after 90 minutes in the dehydration chamber Swatch No. 1 lost approximately 13.95% of its weight, Swatch No. 2 lost approximately 15.22% of its weight, and Swatch No. 3 lost approximately 12.91% of its weight. The average weight loss after 90 minutes in the dehydration chamber was approximately 14.02%.

Table 16. Water Retention of Conditioner E Without Mineral Composition Added

Time Elapsed (minutes)	Swatch #1 (grams)	Swatch #2 (grams)	Swatch #3 (grams)	Average (grams)
0	2.84	2.56	3.21	2.87
15	2.66	2.42	3.07	2.72
30	2.53	2.36	2.95	2.61
45	2.36	2.28	2.84	2.49
60	2.28	2.23	2.78	2.43
75	2.25	2.18	2.72	2.38
90	2.22	2.05	2.63	2.30

The results reported in Table 16 show that after 90 minutes in the dehydration chamber Swatch No. 1 lost approximately 21.83% of its weight, Swatch No. 2 lost approximately 19.92% of its weight, and Swatch No. 3 lost approximately 18.07% of its weight. The average weight loss after 90 minutes in the dehydration chamber was approximately 19.86%, a substantially greater percentage than that of the conditioners containing the mineral composition.

Table 17. Water Retention of Conditioner F With Mineral Composition Added

Time Elapsed (minutes)	Swatch #1 (grams)	Swatch #2 (grams)	Swatch #3 (grams)	Average (grams)
0	1.99	2.21	2.40	2.20
15	1.86	2.18	2.35	2.13
30	1.86	2.17	2.24	2.09
45	1.84	2.13	2.18	2.05
60	1.84	1.99	1.93	1.92
75	1.80	1.97	2.11	1.96
90	1.74	1.95	2.15	1.95

The results reported in Table 17 show that after 90 minutes in the dehydration chamber Swatch No. 1 lost approximately 12.56% of its weight, Swatch No. 2 lost approximately 11.76% of its weight, and Swatch No. 3 lost approximately 10.42% of its weight. The average weight loss after 90 minutes in the dehydration chamber was approximately 11.52%.

Table 18. Water Retention of Conditioner F Without Mineral Composition Added

Time Elapsed (minutes)	Swatch #1 (grams)	Swatch #2 (grams)	Swatch #3 (grams)	Average (grams)
0	2.15	2.01	1.98	2.05
15	1.99	1.85	1.78	1.87
30	2.05	1.76	1.71	1.84
45	1.87	1.72	1.69	1.76
60	1.64	1.69	1.67	1.67
75	1.70	1.71	1.66	1.69
90	1.78	1.69	1.62	1.70

The results reported in Table 18 show that after 90 minutes in the dehydration chamber Swatch No. 1 lost approximately 17.21% of its weight, Swatch No. 2 lost approximately 15.92% of its weight, and Swatch No. 3 lost approximately 18.18% of its weight. The average weight loss

after 90 minutes in the dehydration chamber was approximately 17.10%, a substantially greater percentage than that of the conditioners containing the mineral composition.

Tables 19 through 24 summarize the ratings given by each hairstylist to each hairspray, both with and without the mineral composition. The hairstylists rated each hairspray according to several characteristics on a scale of 1 to 10, 10 being the best rating. The hairsprays containing the mineral composition also exhibited enhanced performance. These hairsprays provided enhanced style hold, enhanced gloss, reduced static flyaways and enhanced ease of combing or brushing.

Table 19: Hairspray A Without Mineral Composition Added

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Spray Characteristics	3	6	5	6	5	5	3	4	4	6	4	4.64
Target Coverage	7	4	4	7	3	4	4	4	3	4	5	4.45
Workability	3	6	3	7	7	5	7	6	5	5	5	5.36
Drying Time	7	6	4	7	3	7	4	5	4	7	4	5.27
Hold	4	4	4	4	4	3	5	4	6	3	3	4.00
Sheen	3	4	5	7	3	3	6	5	5	3	6	4.55
Stylability	3	4	4	4	6	3	5	6	5	4	5	4.45
Post Style Handling	6	5	3	5	4	5	6	4	5	5	3	4.64
Style Memory	5	4	6	6	7	4	3	4	5	7	3	4.91
Flaking	4	3	3	6	3	5	7	5	4	5	7	4.73
Static Flyaway	5	3	3	7	7	5	3	6	7	7	3	5.09
Overall Condition of Hair	6	7	7	5	6	7	6	3	5	7	4	5.73

Table 20: Hairspray A With Mineral Composition Added

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
-----------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	-------------	-------------	--------------------

Spray Characteristics	7	5	6	6	5	3	5	7	6	3	3	5.09
Target Coverage	7	7	4	3	5	4	7	6	4	6	5	5.27
Workability	5	4	7	6	7	7	5	7	7	6	5	6.00
Drying Time	7	7	6	6	8	5	8	5	7	8	8	6.82
Hold	5	6	7	8	7	7	5	7	8	7	7	6.73
Sheen	6	6	7	5	6	8	7	7	6	5	8	6.45
Stylability	8	6	7	7	7	8	6	5	6	8	7	6.82
Post Style Handling	7	8	7	7	7	7	7	5	5	7	5	6.55
Style Memory	8	8	7	6	7	7	5	6	8	7	6	6.82
Flaking	8	5	6	6	5	8	7	7	7	8	7	6.73
Static Flyaway	6	8	5	8	6	8	5	6	5	8	7	6.55
Overall Condition of Hair	8	5	7	5	5	6	6	8	8	5	8	6.45

Table 21: Hairspray B Without Mineral Composition Added

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Spray Characteristics	6	3	7	6	5	3	6	5	3	4	4	4.73
Target Coverage	6	3	7	6	5	7	5	3	3	3	4	4.73
Workability	5	4	3	4	5	3	3	4	5	4	6	4.18
Drying Time	7	5	6	7	3	3	4	3	4	3	5	4.55
Hold	4	3	4	4	7	4	5	4	7	7	7	5.09
Sheen	7	6	6	6	3	5	4	6	4	4	7	5.27
Stylability	5	5	4	4	6	5	5	5	3	7	7	5.09
Post Style Handling	5	7	3	3	6	3	7	6	4	6	7	5.18
Style Memory	4	5	5	5	4	7	5	7	7	7	6	5.64
Flaking	6	3	6	4	4	7	5	4	7	3	5	4.91
Static Flyaway	6	7	7	5	5	6	6	4	7	6	7	6.00
Overall Condition of Hair	7	5	6	4	3	5	6	4	3	4	4	4.64

Table 22: Hairspray B With Mineral Composition Added

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Spray	7	7	7	5	7	3	6	7	4	6	5	5.82

Characteristics												
Target Coverage	3	4	4	7	3	3	6	7	7	5	5	4.91
Workability	6	3	3	3	7	4	7	3	7	3	3	4.45
Drying Time	6	8	7	8	7	6	7	8	6	6	7	6.91
Hold	8	7	8	8	7	7	5	8	7	7	8	7.27
Sheen	5	8	6	6	8	6	8	7	5	6	7	6.55
Stylability	5	8	6	7	6	5	5	8	8	8	5	6.45
Post Style Handling	8	7	8	5	5	6	5	8	6	5	5	6.18
Style Memory	8	7	6	7	6	8	5	6	7	6	5	6.45
Flaking	8	8	6	7	6	8	7	8	6	7	7	7.09
Static Flyaway	8	8	5	6	6	6	8	6	6	5	6	6.36
Overall Condition of Hair	6	5	8	8	5	5	5	6	8	8	8	6.64

Table 23: Hairspray C Without Mineral Composition Added

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Spray Characteristics	4	6	7	5	5	6	5	5	5	4	7	5.36
Target Coverage	7	5	4	3	4	3	5	5	6	4	3	4.45
Workability	4	6	7	4	4	5	3	7	3	5	5	4.82
Drying Time	6	7	4	4	6	3	4	6	5	7	4	5.09
Hold	3	6	4	6	5	6	4	7	3	7	7	5.27
Sheen	6	3	5	5	7	4	6	6	6	6	3	5.18
Stylability	4	7	7	7	6	4	7	3	7	3	6	5.55
Post Style Handling	3	6	5	7	7	7	6	6	4	7	5	5.73
Style Memory	3	7	5	6	7	6	3	5	6	5	5	5.27
Flaking	4	5	5	4	7	7	3	5	7	7	7	5.55
Static Flyaway	7	3	6	3	3	5	3	4	5	3	5	4.27
Overall Condition of Hair	4	7	6	3	4	5	4	4	4	6	3	4.55

Table 24: Hairspray C With Mineral Composition Added

Test Attributes	H.S. #1	H.S. #2	H.S. #3	H.S. #4	H.S. #5	H.S. #6	H.S. #7	H.S. #8	H.S. #9	H.S. #10	H.S. #11	Average Ratings
Spray Characteristics	7	3	5	7	6	4	7	4	6	3	7	5.36

1

5

10

Target Coverage	4	7	7	4	3	6	7	6	4	7	5	5.45
Workability	3	6	7	3	7	7	4	5	7	7	3	5.36
Drying Time	8	5	8	7	8	6	5	6	6	6	7	6.55
Hold	5	6	7	5	5	5	7	5	6	8	7	6.00
Sheen	8	8	5	6	5	6	5	7	5	8	5	6.18
Stylability	6	6	6	7	8	5	5	6	5	7	7	6.18
Post Style Handling	7	8	8	7	5	8	5	6	6	5	8	6.64
Style Memory	8	7	5	8	6	6	8	8	8	5	8	7.00
Flaking	7	8	5	5	7	8	6	6	6	7	5	6.36
Static Flyaway	7	8	6	8	6	7	6	8	8	7	6	7.00
Overall Condition of Hair	6	7	7	6	5	5	8	6	6	7	5	6.18

15

20

25

30

Hairsprays were also separately tested for curl retention under extremely humid conditions. Three separate swatches of hair were treated with three different hairsprays, curled around a glass rod with a diameter of about 1 cm and allowed to air dry. The lengths between the first and last loops of the curled swatches were recorded, and the swatches were then placed in a humidity chamber measuring 90% relative humidity. The distance between the first and last loops of the curled swatches were recorded at regular time intervals. The test was also conducted on three separate swatches treated with hairsprays not containing the mineral composition. Tables 25 through 30 summarize the results of this testing, showing that the hairsprays containing the mineral composition exhibit enhanced curl retention.

Table 25. Curl Retention of Hairspray D Without Mineral Composition Added

35

Time Elapsed (minutes)	Length of Hair Before Curled	Length of Hair Before Exposure to Humidity	Length of Hair After Exposure to Humidity	Percent Curl Retention
------------------------	------------------------------	--	---	------------------------



1

0	8.00	4.20	4.20	100.00
30	8.00	4.20	4.53	91.32
60	8.00	4.20	4.88	82.11
90	8.00	4.20	4.61	89.21
120	8.00	4.20	5.01	78.68
150	8.00	4.20	5.25	72.37
180	8.00	4.20	5.55	64.47

5

10

15

20

25

30

35

Table 26. Curl Retention of Hairspray D With Mineral Composition Added

Time Elapsed (minutes)	Length of Hair Before Curled	Length of Hair Before Exposure to Humidity	Length of Hair After Exposure to Humidity	Percent Curl Retention
0	8.00	4.53	4.53	100.00
30	8.00	4.53	4.89	89.63
60	8.00	4.53	4.66	96.25
90	8.00	4.53	4.88	89.91
120	8.00	4.53	4.92	88.76
150	8.00	4.53	5.01	86.17
180	8.00	4.53	5.05	85.01

Table 27. Curl Retention of Hairspray E Without Mineral Composition Added

Time Elapsed (minutes)	Length of Hair Before Curled	Length of Hair Before Exposure to Humidity	Length of Hair After Exposure to Humidity	Percent Curl Retention
0	8.00	6.20	6.20	100.00
30	8.00	6.20	6.49	83.89
60	8.00	6.20	6.62	76.67
90	8.00	6.20	6.83	65.00
120	8.00	6.20	6.88	62.22
150	8.00	6.20	6.93	59.44
180	8.00	6.20	7.15	47.22

Table 28. Curl Retention of Hairspray E With Mineral Composition Added

Time Elapsed (minutes)	Length of Hair Before Curled	Length of Hair Before Exposure to Humidity	Length of Hair After Exposure to Humidity	Percent Curl Retention
0	8.00	6.58	6.58	100.00
30	8.00	6.58	6.73	89.44
60	8.00	6.58	6.72	90.14
90	8.00	6.58	6.80	84.51
120	8.00	6.58	6.75	88.03
150	8.00	6.58	7.00	70.42
180	8.00	6.58	7.20	56.34

Table 29. Curl Retention of Hairspray F Without Mineral Composition Added

Time Elapsed (minutes)	Length of Hair Before Curled	Length of Hair Before Exposure to Humidity	Length of Hair After Exposure to Humidity	Percent Curl Retention
0	8.00	5.89	5.89	100.00
30	8.00	5.89	6.20	85.31
60	8.00	5.89	6.12	89.10
90	8.00	5.89	6.35	78.20
120	8.00	5.89	6.49	71.56
150	8.00	5.89	6.58	67.30
180	8.00	5.89	6.79	57.35

Table 30. Curl Retention of Hairspray F With Mineral Composition Added

Time Elapsed (minutes)	Length of Hair Before Curled	Length of Hair Before Exposure to Humidity	Length of Hair After Exposure to Humidity	Percent Curl Retention
0	8.00	6.35	6.35	100.00
30	8.00	6.35	6.39	97.58
60	8.00	6.35	6.49	91.52
90	8.00	6.35	6.56	87.27
120	8.00	6.35	6.72	77.58
150	8.00	6.35	6.71	78.18
180	8.00	6.35	6.76	75.15

Tables 25 through 30 show an average curl retention of 56.35% after 180 minutes in the humidity chamber for swatches treated with hairsprays not containing the mineral composition. The average curl retention of swatches treated with hairspray containing the mineral composition after 180 minutes in the humidity chamber is 72.17%. Therefore, the hairsprays containing the mineral composition exhibit substantially greater curl retention than those not containing the mineral composition.

The preceding description has been presented with

1

reference to presently preferred embodiments of the invention.  
Workers skilled in the art and technology to which this  
invention pertains will appreciate that alterations and  
changes in the described embodiments may be practiced without  
meaningfully departing from the principal, spirit and scope of  
this invention.

5

10

Accordingly, the foregoing description should not be read  
as pertaining only to the precise embodiments described, but  
rather should be read consistent with and as support for the  
following claims which are to have their fullest and fairest  
scope.

15

20

25

30

35